DOCUMENT RESUME

ED 264 112 SE 046 272

TITLE	Making Your Own Hollow Blocks. What We Make. Science and Technology Education in Philippine Society.
INSTITUTION	Philippines Univ., Quezon City. Inst. for Science and Mathematics Education Development.
SPONS AGENCY	Educational Development Projects Implementing Task Force (Philippines).
REPORT NO	ISBN-971-135-07-5
PUB DATE	Feb 84
NOTE	14p.; For other documents in this series see SE 046 255-274.
AVAILABLE FROM	University of the Philippines, Institute for Science and Mathematics Education Development, Pardo de Tavera St., Diliman, Quezon City, Philippines ($1.25).
PUB TYPE	Guides - Classroom Use - Materials (For Learner) (051)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Bricklaying; *Construction Materials; Foreign Countries; High Schools; Learning Activities; Science Education; Secondary School Science
IDENTIFIERS	*Bricks; *Philippines

ABSTRACT

The procedures needed to make hollow blocks from palay hull, sawdust, soil, or sand are outlined in this module. Also outlined are the procedures needed to construct the wooden molds used to make the blocks. The hollow blocks can be used in building a one story house where the roof does not rest on the hollow block wall, an additional room to the school house, the school garden wall, plant boxes, or compost pits. (JN)

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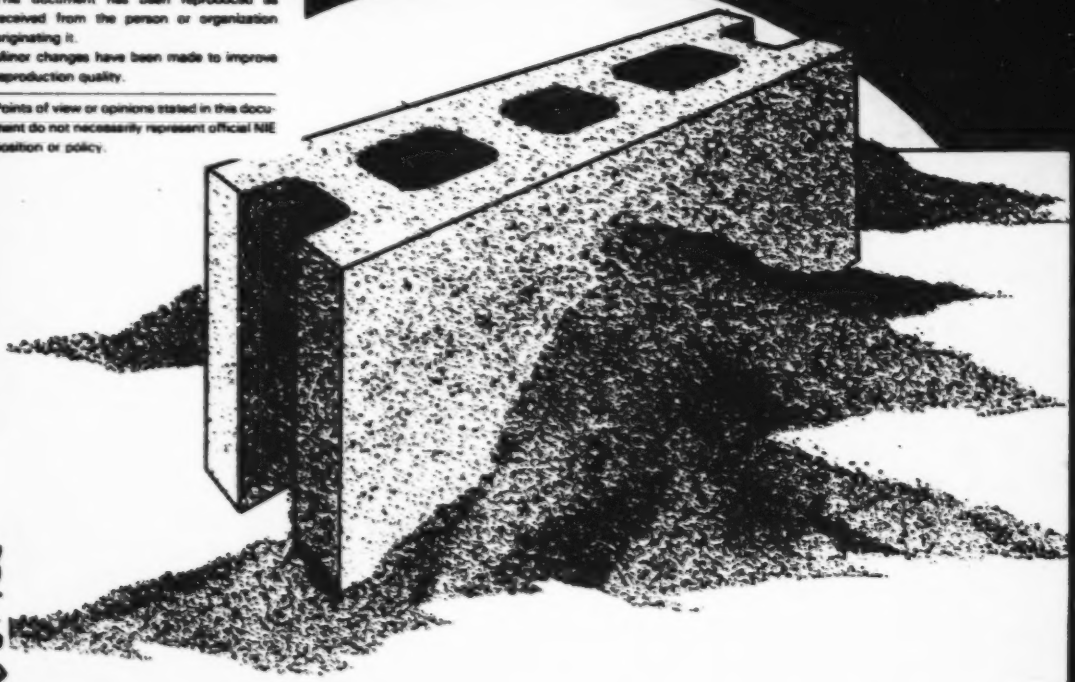

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Making your own HOLLOW BLOCKS

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ISBN 971-135-079-5
Published and printed by the

INSTITUTE FOR SCIENCE AND MATHEMATICS EDUCATION DEVELOPMENT
Vidal A. Tan Hall
University of the Philippines
Diliman, Quezon City

February, 1984

MAKING YOUR OWN HOLLOW BLOCKS

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Making Your Own Hollow Blocks

A developing country like ours needs to push forward its economic prosperity and enrich the quality of life of its people. Our youth need to know many more skills to improve themselves or their way of life.

Building materials are beginning to be hard to get. In some places even bamboos, which many years ago one could get for free are no longer easily available. So, we have to look for materials we can use to meet our building needs.

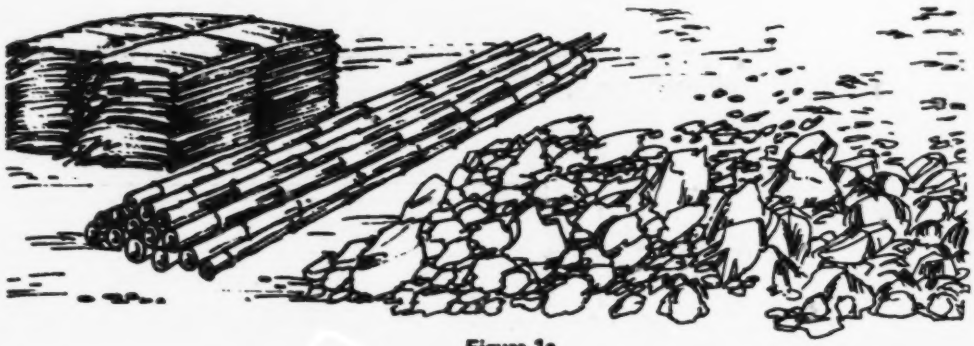


Figure 1a

With the increase in price of fuel oil, the cost of cement has also gone up and is bound to go still higher so production cost of construction hollow blocks will also be higher.

The research on low cost building materials of the Forest Product Research and Industries Development Commission (FORPRIDECOM) NSDB-College, Laguna comes a timely solution to a need. In 1979, it published a manual for the manufacture of hollow blocks out of soil. Beach sand, and agricultural wood wastes such as rice hull, sawdust, wood chips, coconut husk particles, and sugar cane bagasse were also recommended instead of soil.

Tests performed by FORPRIDECOM have shown that these hollow blocks "out of soil" are comparable to some commercial concrete hollow blocks.

Commercial concrete hollow blocks use sand and gravel as the fine and coarse aggregates mixed with cement and water. Rice hulls, sawdust or soil from excavations, however, may be used instead as aggregates in making hollow blocks.

This module presents an adaptation of their procedure using wooden hand molds. Work with small amounts to gain experience and skill in the making of hollow blocks from palay hull, sawdust, soil or sand.

If you live on a rice farm, you and your farmer neighbors are likely to burn the rice hull and pollute the surrounding air. Use the rice hull instead in the manufacture of hollow blocks.

If you live near a sawmill, substitute sawdust for rice hull. If you live near the sea, use sea sand. Soil from any excavation can also be used to produce building hollow blocks.

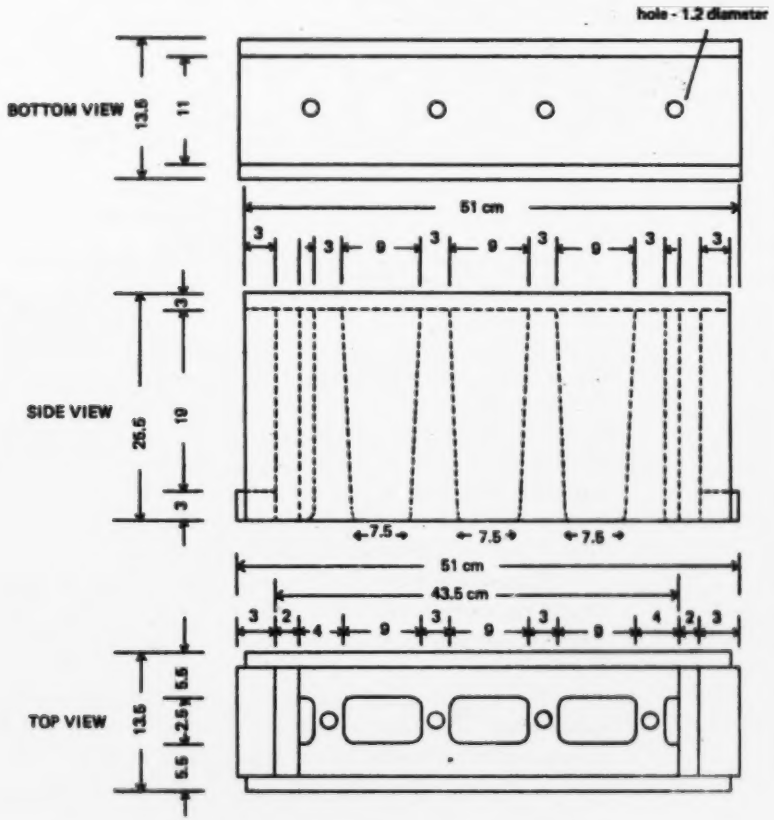
Activity 1. CONSTRUCTION OF WOODEN EQUIPMENT

Materials

wood	carpentry tools
nails	1 sq.m flat galvanized iron sheet

PROCEDURE

Follow the dimensions given below. All the inner part is lined with galvanized iron sheet.



Activity 2. MAKING OF HOLLOW BLOCKS

Materials

- Cement
- *palay* hull, sawdust, sand or soil*
- wooden mold constructed in Activity 1
- can for measuring
- trowel or shovel
- water

PROCEDURE

1. Measure the materials using the measuring can. See table. These proportions gave the strongest hollow blocks as tested by the compression test machine of the College of Engineering, U.P. See Appendix A.

Table 1. Proportion by Volume of Raw Materials

Palay	Soil	Sawdust	Sand	Cement	Remarks
			4	1	load bearing
			6	1	non-load bearing
	1	3		1	"
1	1		1	1	"
2	2			1	"
3	1			1	"
2	2			1	"

2. Mix the dry ingredients thoroughly (Fig. 3).

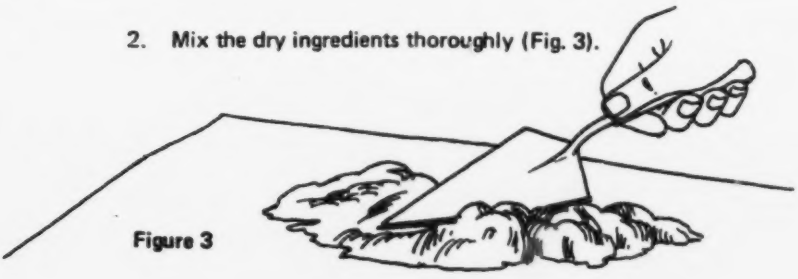


Figure 3

*Suggestions : Scrape off approximately 5 cm top soil which contains humus (decayed organic matter). Break big lumps of soil and remove the big stones.

3. Form a mound and make a circular hole in the middle of the mixture as shown. Fig. 4

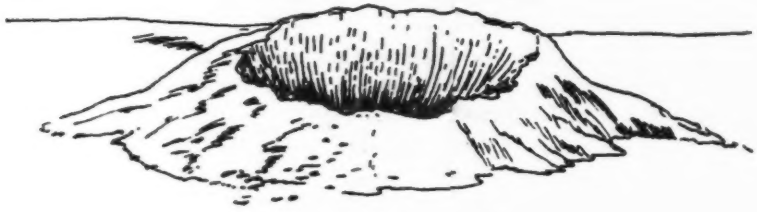


Figure 4

4. Pour about 1/2 of a measure of water into the hole. Allow the water to seep into the mixture.

5. Mix well. Add more water, if needed, to make it neither too dry nor too wet (Fig. 5).

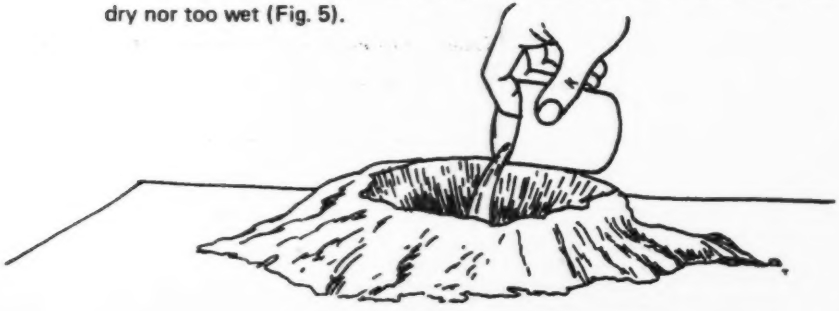


Figure 5

Note: The amount of water added and thorough mixing are the most important factors in the preparation of the cementing material. You can only estimate the right amount of water. This needs careful observation and experience. When soil is used, less water is needed than for non-soil mixtures.

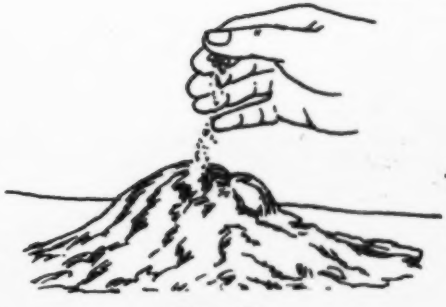


Figure 5a

Figure 5b

6. Place the mold in an upright position on a level surface (Fig. 6).

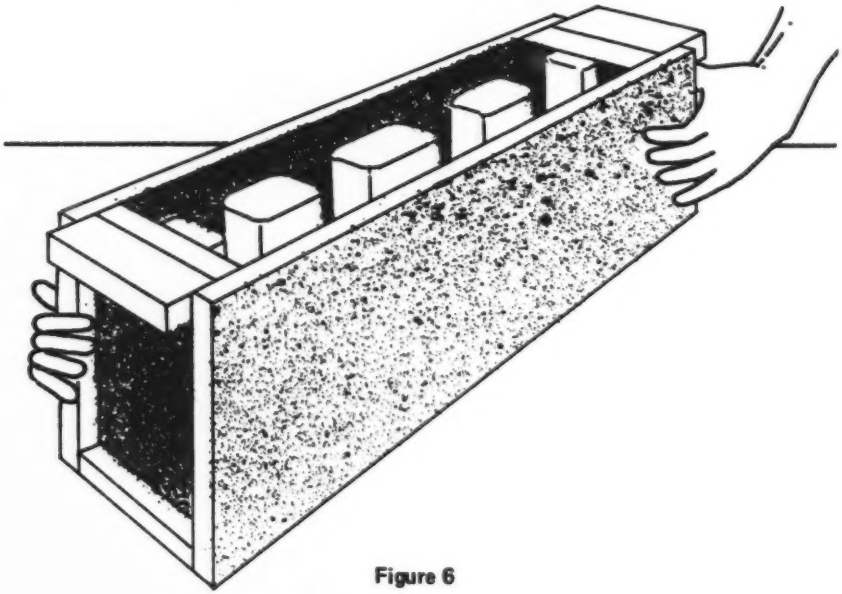


Figure 6

7. Put the mixture in the mold until half-full. Pack the mold (Fig. 7a and 7b).

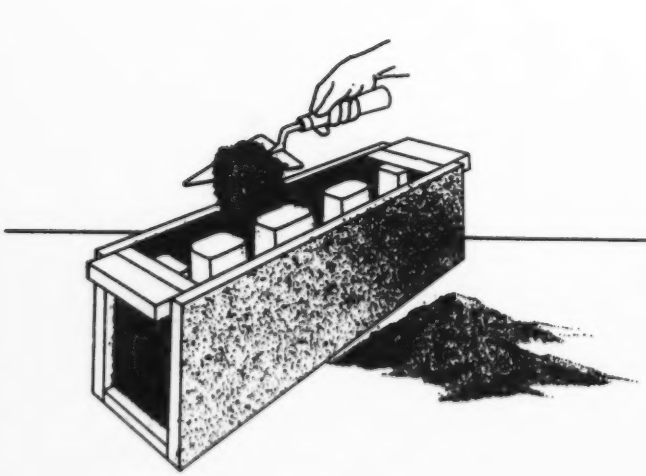


Figure 7a

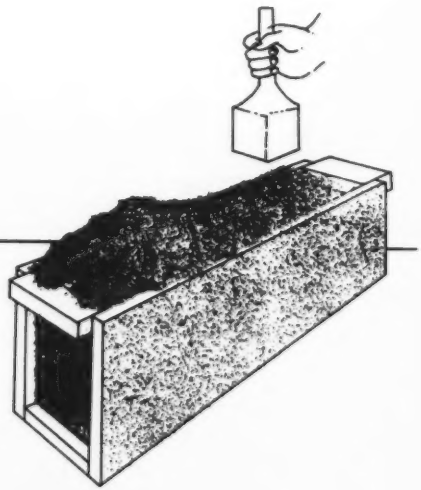


Figure 7b

8. Add more of the mixture until you have filled the mold. Pack and level the surface using a piece of wood. Fig. 6

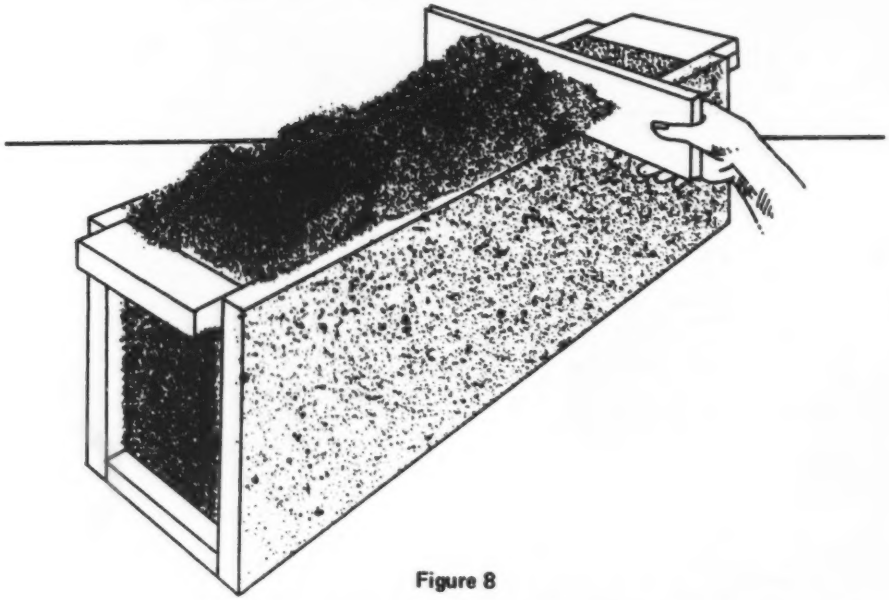


Figure 8

9. Invert the mold carefully and pull the mold upward (Fig. 9 and Fig. 10).

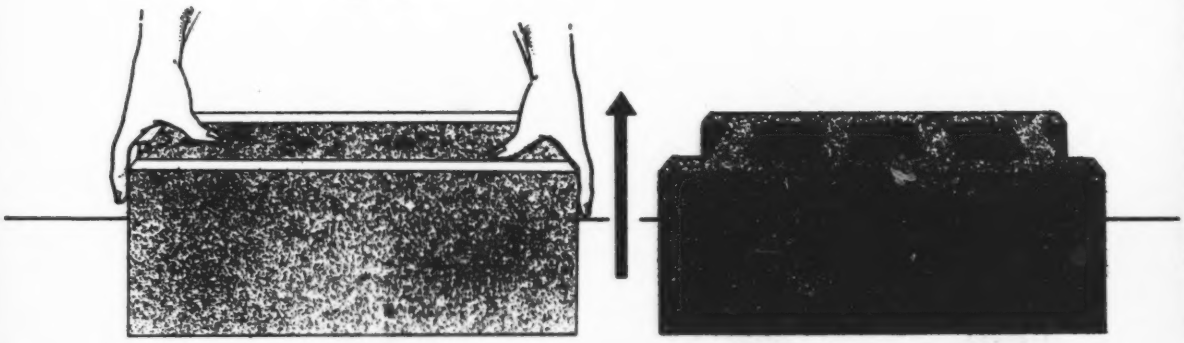


Figure 9

Figure 10

If you have the right proportion, the mold can be drawn easily. If it is too dry, some of the mixture will remain in the mold. Add more water to the mixture to remedy this problem. If it is too wet, the top side of the hollow block will sag. In this case add a new dry mixture.

10. Sprinkle daily the hollow blocks with water. Do this for a curing period of 28 days. A can with very fine holes at the bottom can take the place of the sprinkler. (Fig. 11).

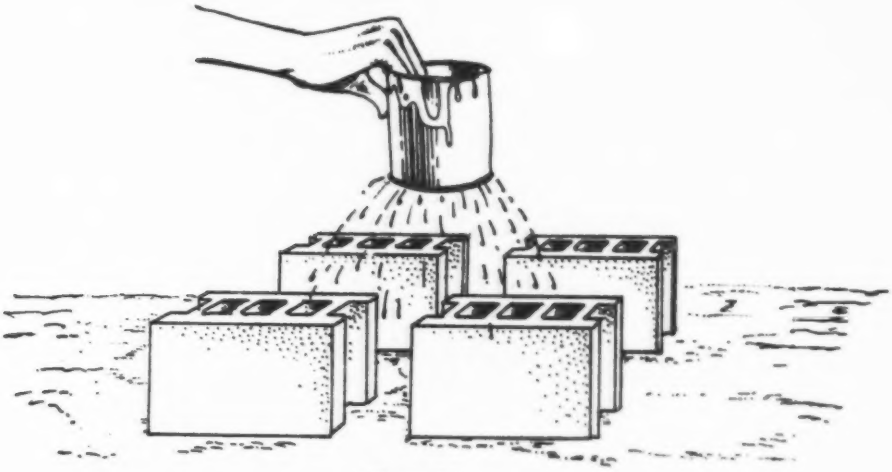


Figure 11

Note: You might have skilled masons in your community. Seek their advice. Try out their suggestions about proportions of the materials and mixing procedures.

Activity 3:

1. Set up each hollow block on its narrow side. Put a rectangular piece of wood over the block. The whole surface of the block must be covered by the wood.

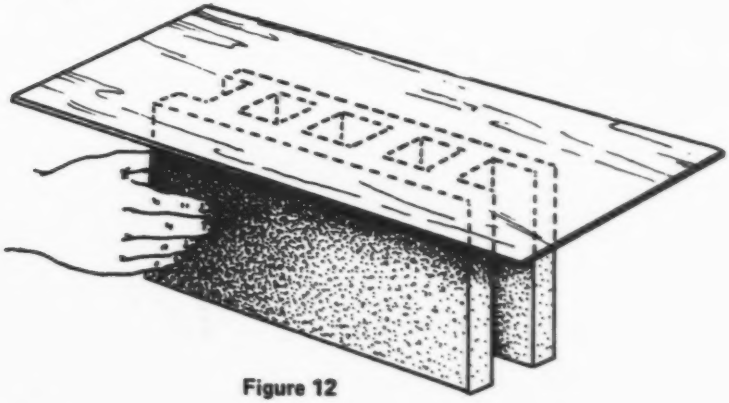


Figure 12

2. Hold the hollow block while flat heavy objects are successively added on the block until it cracks.

   - ☐ 1. When the block cracks, weigh the objects and record their total mass (kilograms). Do this for each cracked hollow block.
   - ☐ 2. Compute the weight of the objects in newtons. 1 kilogram mass has a weight of 9.8 newtons. Tabulate your data.
   - ☐ 3. Which hollow block stood the greatest weight?
   - ☐ 4. Divide the weight in newtons by the area in sq. m. of the narrow side of the block

Note: Devise other ways to measure the compression strength of the blocks. Consult your teacher, your father or neighbors.

These hollow blocks can be used in building a one story house where the roof does not rest on the hollow block wall, an additional room to the school house, the school garden wall, plant boxes or compost pits.

You may also decide to start a small scale industry making hollow blocks as a community project.

If you intend to use hollow blocks for your house or school write to the Commissioner, Forest Products Research and Industries Development Commission, NSDB, College, Laguna. Available for sale is a construction guide entitled, "Manual of Construction for Self Reliance Low-Cost House" using hollow blocks. Rural communities may also request for free advice from FORPRIDECOM architects and engineers.

APPENDIX A

Table 1

Compression Tests Data on Try-out Hollow Blocks

Proportion by Volume				WIDTH cm	DEPTH cm	HEIGHT cm	No. of Cells	Total Mass kg.	Ultimate Compressive Load After 28 days	
PALAY	SOIL	SAND	CEMENT						N/sq. m.	lbs.
		4	1	40.5	10	21	3	12.255	8.099×10^6	75,250
3	2		1	40.5	10	21	3	6.655	1.375×10^6	12,775
3	1		1	40.5	10	21	3	5.915	1.059×10^6	9,825
2	2		1	40.5	10	21	3	7.255	1.009×10^6	9,375
2		2	1	40.5	10	21	3	7.757	1.466×10^6	13,625

Table 2

Compression Tests Data on 3 Commercial Hollow Blocks

Commercial Non-load Bearing Hollow Blocks	WIDTH cm	DEPTH cm	HEIGHT cm	No. of Cells	Total Mass kg.	Ultimate Compressive Load After 28 days	
						N/sq. m.	lbs.
Sample 1	40.5	10	21	3	10.620	7.804×10^5	7,250
Sample 2	40.5	10	21	3	10.000	5.920×10^5	5,500
Sample 3	40.5	10	21	3	10.550	1.372×10^6	12,750